Modeling Nonstationary Process Using Geodesics

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ABSTRACT: Classical spectral estimation relies on the assumption that time-series data are generated by a second-order stationary process, which is almost never the case in practice. Inspired by the least squares line fitting, we use the geodesic, which is a curve on the manifold of spectral density functions with the minimum total length, to model and estimate the evolution of the spectral density function. To proceed, we first need the proper distance measures quantifying the difference between two spectral density functions. The purpose of this talk is to study the suitable metrics for power spectra,and their geodesics to approximate the slowly time-varying spectral density functions. This idea can be applied to various signal processing problems, such as spectral tracking for slowly time-varying signal and speech morphing.

Biography: Xianhua Jiang is a PhD candidate of the Department of Electrical and Computer Engineering at the University of Minnesota. She obtained the Bachelor degree in 2001 and the Master degree in 2004 from Zhejiang University, China. From Sept. 2004 to May 2006, she was a research assistant on robotics and pattern recognition at the University of Vermont. She has been with the University of Minnesota since Sept. 2006. Her current research areas include nonstationary signal analysis, speech processing, and spectral estimation.